Privacy-loss Budget Allocation 2022-03-16
Person Tables
United States

Global *rho*	3.325
Global epsilon*	20.82
delta	10^{-10}

**When converting ρ-based privacy-loss budgets to (ε,δ) equivalents, we are selecting a single point along the continuum of (ε,δ) pairs. Analysis of the privacy protection afforded by a ρ budget should use the entire continuum, not a single (ε,δ) point. Some formulas provide tighter bounds on the (ε,δ) curve implied by a particular value of ρ. We have used this one:*

$$\varepsilon = \rho + 2 * \sqrt{-\rho * \log_e \delta}$$

Source: Bun, M., & Steinke, T. (2016, November). Concentrated differential privacy: Simplifications, extensions, and lower bounds. In Theory of Cryptography Conference (pp. 635-658). Springer, Berlin, Heidelberg.

	rho **Allocation by Geographic Level**
US	1.95%
State	27.07%
County	8.42%
Population Estimates Primitive Geography†	12.93%
Tract Subset Group‡	12.93%
Tract Subset‡	23.46%
Optimized Block Group◊	12.93%
Block	0.30%

	Per Query *rho* Allocation by Geographic Level							
Query	US	State	County	Population Estimates Primitive Geography†	Tract Subset Group‡	Tract Subset‡	Optimized Block Group◊	Block
AGE (3 bins) * HHGQ (4 Levels) (12 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
AGE (3 bins) * SEX (6 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
AGE (13 bins) * SEX (26 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
HISPANIC * SEX (4 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
SEX * HHGQ (4 levels) (8 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
HISPANIC * SEX * AGE (13 bins) * HHGQ (8 levels) * CENRACE (26,208 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
HHGQ (8 levels) * AGE (23 bins) * HISPANIC * CENRACE * SEX (46,368 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
RELGQ * AGE (23 bins) * HISPANIC * CENRACE * SEX (243,432 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%
RELGQ * SEX * AGE (116 bins) * HISPANIC * CENRACE (1,227,744 cells)	0.22%	3.01%	0.94%	1.44%	1.44%	2.61%	1.44%	0.03%

†Population Estimates Primitive Geographies are the most granular geographic unit used by the Census Bureau's Population Estimates Program. These geographic units are the most granular geographic areas that are required in order to derive tables for every geography for which official population estimates are produced.

‡Tract Subsets are defined as the intersection of Population Estimates Primitive Geographies with census tabulation tracts. Tract Subset Groups are defined as the union of multiple tract subsets that are all within the same Population Estimates primitive geography.

◊ Optimized Block Groups are defined as sequentially grouped blocks within the same Tract Subset in the order of the geoid until either there are no more blocks within the Tract Subset left or there are sqrt(number_of_blocks_in_tract_subset) + 13 blocks in the block group.

Per Attribute Rho (Persons Tables)		
	RELGQ	2.22
	SEX	2.96
	AGE	2.59
	HISPANIC	1.85
	CENRACE	1.48

Privacy-loss Budget Allocation 2022-03-16
Units Tables
United States

Global *rho*	3.87
Global *epsilon* *	22.77
delta	10^{-10}

**When converting ρ-based privacy-loss budgets to (ε,δ) equivalents, we are selecting a single point along the continuum of (ε,δ) pairs. Analysis of the privacy protection afforded by a ρ budget should use the entire continuum, not a single (ε,δ) point. Some formulas provide tighter bounds on the (ε,δ) curve implied by a particular value of ρ. We have used this one:*

$$\varepsilon = \rho + 2 * \sqrt{-\rho * \log_e \delta}$$

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	rho **Allocation by**
US	6.84%
State	28.39%
County	11.10%
Population Estimates Primitive Geography†	11.10%
Tract Subset Group‡	11.10%
Tract Subset‡	20.13%
Optimized Block Group◊	11.10%
Block	0.26%

	Per Query *rho* Allocation by Geographic Level							
Query	US	State	County	Population Estimates Primitive Geography†	Tract Subset Group‡	Tract Subset‡	Optimized Block Group◊	Block
SEX * HISPANIC * HH_TENURE * RACE * FAMILY_NONFAMILY_SIZE (728 cells)	0.00%	0.00%	0.00%	2.77%	2.77%	5.03%	2.77%	0.06%
SEX * HISPANIC * HH_TENURE * RACE * HH_AGE * FAMILY_NONFAMILY_SIZE (6,552 cells)	0.00%	0.00%	0.00%	2.77%	2.77%	5.03%	2.77%	0.06%
SEX * HH_AGE * HISPANIC * RACE * ELDERLY * HH_TENURE * HH_TYPE (1,052,352 cells)	1.71%	7.10%	1.81%	2.77%	2.77%	5.03%	2.77%	0.06%
TENVACGQ (35 cells)	0.42%	5.81%	1.81%	2.77%	2.77%	5.03%	2.77%	0.06%
MULTG * HISPANIC * HH_TENURE (8 cells)	1.29%	1.29%	1.29%	0.00%	0.00%	0.00%	0.00%	0.00%
PARTNER_TYPE_OWN_CHILD_STATUS * SEX * HH_TENURE (24 cells)	1.29%	1.29%	1.29%	0.00%	0.00%	0.00%	0.00%	0.00%
COUPLED_HH_TYPE * HISPANIC * HH_TENURE (20 cells)	1.29%	1.29%	1.29%	0.00%	0.00%	0.00%	0.00%	0.00%
SEX * HISPANIC * HH_TENURE * RACE * DETAILED_COUPLETYPE_MULTG_OWNCHILD_SIZE (5,544 cells)	0.42%	5.81%	1.81%	0.00%	0.00%	0.00%	0.00%	0.00%
SEX * HISPANIC * HH_TENURE * RACE * HH_AGE * DETAILED_COUPLETYPE_MULTG_OWNCHILD_SIZE (49,896 cells)	0.42%	5.81%	1.81%	0.00%	0.00%	0.00%	0.00%	0.00%

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‡*Tract Subsets are defined as the intersection of Population Estimates Primitive Geographies with census tabulation tracts. Tract Subset Groups are defined as the union of multiple tract subsets that are all within the same Population Estimates primitive geography.*

◊ *Optimized Block Groups are defined as sequentially grouped blocks within the same Tract Subset in the order of the geoid until either there are no more blocks within the Tract Subset left or there are sqrt(number_of_blocks_in_tract_subset) + 13 blocks in the block group.*

Per Attribute Rho (Units Tables)		
	SEX	2.74
	HH_AGE	1.76
	HISPANIC	2.89
	RACE	2.59
	ELDERLY	0.93
	HH_TENURE	3.04
	HH_TYPE	3.04
	TENVACGQ	0.83

Privacy-loss Budget Allocation 2022-03-16
United States

Cross-Universe (Persons+Units), Cross-Product (P.L. 94-171 Redistricting Data and DHC), By-Geolevel Rho		
	Block within Block Group	0.13
	Block within County	5.54
	Block within State	6.54
	Block within US	9.43

Cross-Universe (Persons+Units), Cross-Product (P.L. 94-171 Redistricting Data and DHC), Global Privacy-loss Budget		
	Global *rho*	9.825
	Global *epsilon* *	39.907
	delta	10^{-10}

**When converting ρ-based privacy-loss budgets to (ε,δ) equivalents, we are selecting a single point along the continuum of (ε,δ) pairs. Analysis of the privacy protection afforded by a ρ budget should use the entire continuum, not a single (ε,δ) point. Some formulas provide tighter bounds on the (ε,δ) curve implied by a particular value of ρ. We have used this one:*

$$\varepsilon = \rho + 2 * \sqrt{-\rho * \log_e \delta}$$

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Privacy-loss Budget Allocation 2022-03-16
Person Tables
Puerto Rico

Global *rho*	3.325
Global *epsilon* *	20.82
delta	10^{-10}

**When converting ρ-based privacy-loss budgets to (ε,δ) equivalents, we are selecting a single point along the continuum of (ε,δ) pairs. Analysis of the privacy protection afforded by a ρ budget should use the entire continuum, not a single (ε,δ) point. Some formulas provide tighter bounds on the (ε,δ) curve implied by a particular value of ρ. We have used this one:*

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	rho **Allocation by Geographic Level**
PR	27.61%
Municipio	8.59%
Population Estimates Primitive Geography†	13.19%
Tract Subset Group‡	13.19%
Tract Subset‡	23.93%
Optimized Block Group◊	13.19%
Block	0.31%

	Per Query *rho* Allocation by Geographic Level						
Query	PR	Municipio	Population Estimates Primitive Geography†	Tract Subset Group‡	Tract Subset‡	Optimized Block Group◊	Block
AGE (3 bins) * HHGQ (4 Levels) (12 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
AGE (3 bins) * SEX (6 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
AGE (13 bins) * SEX (26 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
HISPANIC * SEX (4 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
SEX * HHGQ (4 levels) (8 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
HISPANIC * SEX * AGE (13 bins) * HHGQ (8 levels) * CENRACE (26,208 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
HHGQ (8 levels) * AGE (23 bins) * HISPANIC * CENRACE * SEX (46,368 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
RELGQ * AGE (23 bins) * HISPANIC * CENRACE * SEX (243,432 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%
RELGQ * SEX * AGE (116 bins) * HISPANIC * CENRACE (1,227,744 cells)	3.07%	0.95%	1.47%	1.47%	2.66%	1.47%	0.03%

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Per Attribute Rho (Persons Tables)		
	RELGQ	2.22
	SEX	2.96
	AGE	2.59
	HISPANIC	1.85
	CENRACE	1.48

Privacy-loss Budget Allocation 2022-03-16
Units Tables
Puerto Rico

Global *rho*	3.87
Global *epsilon* *	22.77
delta	10^{-10}

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	rho **Allocation by Geographic Level**
PR	30.42%
Municipio	11.85%
Population Estimates Primitive Geography†	11.93%
Tract Subset Group‡	11.93%
Tract Subset‡	21.65%
Optimized Block Group◊	11.93%
Block	0.28%

	Per Query *rho* Allocation by Geographic Level						
Query	PR	Municipio	Population Estimates Primitive Geography†	Tract Subset Group‡	Tract Subset‡	Optimized Block Group◊	Block
SEX * HISPANIC * HH_TENURE * RACE * FAMILY_NONFAMILY_SIZE (728 cells)	0.00%	0.00%	2.98%	2.98%	5.41%	2.98%	0.07%
SEX * HISPANIC * HH_TENURE * RACE * HH_AGE * FAMILY_NONFAMILY_SIZE (6,552 cells)	0.00%	0.00%	2.98%	2.98%	5.41%	2.98%	0.07%
SEX * HH_AGE * HISPANIC * RACE * ELDERLY * HH_TENURE * HH_TYPE (1,052,352 cells)	7.61%	1.94%	2.98%	2.98%	5.41%	2.98%	0.07%
TENVACGQ (35 cells)	6.24%	1.94%	2.98%	2.98%	5.41%	2.98%	0.07%
MULTG * HISPANIC * HH_TENURE (8 cells)	1.36%	1.36%	0.00%	0.00%	0.00%	0.00%	0.00%
PARTNER_TYPE_OWN_CHILD_STATUS * SEX * HH_TENURE (24 cells)	1.36%	1.36%	0.00%	0.00%	0.00%	0.00%	0.00%
COUPLED_HH_TYPE * HISPANIC * HH_TENURE (20 cells)	1.36%	1.36%	0.00%	0.00%	0.00%	0.00%	0.00%
SEX * HISPANIC * HH_TENURE * RACE * DETAILED_COUPLETYPE_MULTG_OWNCHILD_SIZE (5,544 cells)	6.24%	1.94%	0.00%	0.00%	0.00%	0.00%	0.00%
SEX * HISPANIC * HH_TENURE * RACE * HH_AGE * DETAILED_COUPLETYPE_MULTG_OWNCHILD_SIZE (49,896 cells)	6.24%	1.94%	0.00%	0.00%	0.00%	0.00%	0.00%

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Per Attribute Rho (Units Tables)		
	SEX	2.79
	HH_AGE	1.81
	HISPANIC	2.89
	RACE	2.68
	ELDERLY	0.93
	HH_TENURE	3.00
	HH_TYPE	3.00
	TENVACGQ	0.88

Privacy-loss Budget Allocation 2022-03-16
Puerto Rico

Cross-Universe (Persons+Units), Cross-Product (P.L. 94-171 Redistricting Data and DHC), By-Geolevel Rho		
	Block within Block Group	0.13
	Block within Municipio	6.12
	Block within PR	7.31

Cross-Universe (Persons+Units), Cross-Product (P.L. 94-171 Redistricting Data and DHC), Global Privacy-loss Budget		
	Global *rho*	9.825
	Global *epsilon*	39.907
	delta	10^{-10}

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$$\varepsilon = \rho + 2 * \sqrt{-\rho * \log_e \delta}$$

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